

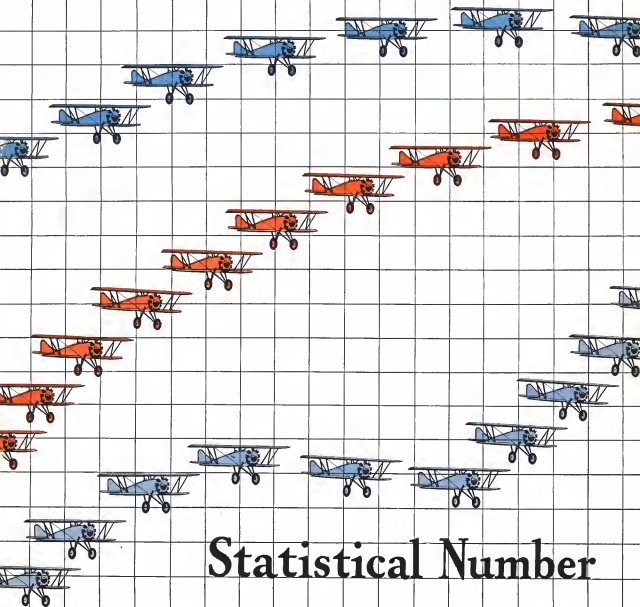
October 5, 1929

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AVIATION

The Oldest American Aeronautical Magazine



Statistical Number



"VIA PATRICIAN" Shortens the Overland Schedules

Most air travelers use the airplane to save time. And since speed is an important consideration, the ability of the swift Keystone Patrician to reduce existing schedules on long distance routes, strikingly demonstrates its position of unchallenged leadership in large-scale passenger service.

Cruising comfortably at 120 miles per hour, drawing only partially an air total of 1575 horse-power, climbing over the highest mountain ranges with ease, landing gently at 35 miles per hour, the Patrician establishes new standards of performance for large-sized air motorized transports.

With superior performance, the Patrician offers new horizons in safety and comfort. Unobstructed vision, luxurious accommodations and freedom from

noise in the roomy cabin, combined with ample power reserve and noteworthy improvement in construction, explain the wide public acceptance of the big ship as regular passenger routes. And its remarkably low operating cost of *seven cents per passenger mile*, gives the Patrician unquestioned leadership in operating economy, paving the way for lower fares and greater volume of traffic.

For these and many other reasons the Patrician is recognized as the most advanced transport for overland service in production today.

KEYSTONE AIRCRAFT CORPORATION
Sole Office: 164 57 & 58th Sts., NEW YORK
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KEYSTONE
"BIG AIRCRAFT" "IN SMALL FORM"



The
ARGO
*Offers the Utmost
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Perhaps it's a quick and pleasant journey—before lunch business appointments miles away—demands your presence. For either the Hess "Warrior" powered Argo offers the utmost in speed, dependable transportation.

Small enough to be fast—large enough to carry two or comfort the Argo has made a great name for itself in the small plane field. The appointments are such as you would expect to find in a plane much higher in price. You can cruise at 100 miles per hour or it may be pressing 25 more an hour with ease.

The Argo is powered by our own Hess "Warrior" engine. Both engine and plane bear the Dept. of Commerce Certificate. A seven cylinder, radial, air-cooled engine the Hess "Warrior" develops 115 h.p. at 1825 r.p.m.

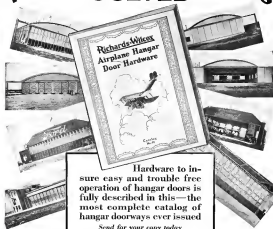
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J. B. Griffin, Vice-President of Gilmore Airplane Landing Co., Chairman of the Airport.

J. B. Griffin, Vice-President of Gilmore Airplane Landing Co., Chairman of the Airport.



Hangar and Administration Building at Albuquerque, New Mexico, "the Hub of the Far West," built by the Gilmore Airplane Landing Co.



Airplane Landing Co., the Hub of the Far West, built by the Gilmore Airplane Landing Co.



AIRLINES, East and West and North and South make Albuquerque a port of call and have created this into the Air Hub of the Far West. In order to provide the most satisfactory landing area and take-off runways for con-

stantly increasing traffic, the owners and builder of this key-port, after a complete investigation selected Gilmore Airport Oil and the Gilmore Plastic Method of surfacing, perfected by the Gilmore Oil Co., Los Angeles.

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Special Asphaltic Airport Oils for AIRPORT SURFACING

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CENTRAL AIRPORT, serving the Philadelphia-Camden metropolitan area, will rank as one of the world's greatest air terminals. Owners and community are alike justly proud of this magnificent achievement, built for practical operation; but carrying an air of substance and simplicity that reflects the character of the men behind it. . . . We too take pride in the part we have played in the design and construction of Central Airport. At every step in its development, from preliminary planning with owners and architects to the last detail of construction, A. D. & C. service has functioned to produce maximum results at minimum cost.

Reports - Consultation
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A GREAT AVIATION CENTER

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[illegible]

Germany. Austria is the vibrant assembly of the East. Limited railway between the financial and political capitals of the country, and near to back, as the population center of the Atlantic coast, and along to its geographical center, Central Austria is the heart of the growing system of stretch highways.

Since its establishment, every aspect of material or personal significance in commercial thought has sought the entry, the recognition, the standing service and approval of General Aoyagi. At the same divisions of the National Air Force started from late 1941 in Japan. The 10th Air Division, the first week, was established by the General Aoyagi in Japan as America. The supply routes of the National Air Force, continuing to the 10th Air Division, will come to the General Aoyagi, early in October.

remains in the Thakolehly-Cumden area, with its three million people, its thousands of factories its industries devoted to the production of metals, woods, mainly textiles, equipment, instruments and parts for the aerospace industry.

[illegible]

General Airport is the focal point for

PHILADELPHIA-CAMDEN

CENTRAL AIRPORT

first—CHECK THE QUALIFICATIONS THAT IDEAL AIRPORT BUILDING MATERIAL SHOULD HAVE

- ✓ FIRE SAFETY
- ✓ ECONOMY
- ✓ SPEEDY CONSTRUCTION
- ✓ PERMANENCE



- ✓ LOW MAINTENANCE
- ✓ LOW DEPRECIATION
- ✓ DECREASED HEAT LOSSES

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THE COMPLETE LINE OF
STRUCTURAL CLAY TILE

General Offices: Fulton Building, Pittsburgh, Pa.
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In Canada: National Fire Proofing Co. of Canada, Ltd., Toronto, Ontario

then—CHECK UP ON NATCO STRUCTURAL CLAY TILE

A TYPE FOR EVERY AIRPORT NEED



NATCO LINEMAN
For interior walls (used with some types of roof) without loss of strength.



NATCO WALL TILE
For exterior walls (used with some types of roof) without loss of strength.



NATCO DOUBLE SHELL
For exterior walls (used with some types of roof) without loss of strength.



NATCO VENTILE
For exterior walls (used with some types of roof) without loss of strength.



NATCO ROOF TILE
For exterior walls (used with some types of roof) without loss of strength.



NATCO WALL TILE
For exterior walls (used with some types of roof) without loss of strength.



NATCO DOUBLE SHELL
For exterior walls (used with some types of roof) without loss of strength.



NATCO VENTILE
For exterior walls (used with some types of roof) without loss of strength.

✓ FIRE SAFETY

Non-flammable Clay Tile assembled from special clay and burned at great heat, at a temperature of over 2000 degrees. Its density and strength of rock. Absolutely non-combustible. Does help contain a fire and afterwards permit a minimum of damage.

✓ ECONOMY

The large, easily handled units are laid in regular settings in rows, lanes, courses, and squares. First cost is low, upkeep is small.

✓ SPEEDY CONSTRUCTION

The various types of Natco Tile provide a size and style for every building need. Each tile is represented in volume in several feet. Natco airports are being erected with good flying results, are quickly ready for use.

✓ PERMANENCE

Natco Tile are unaffected by heat and cold, dampness, chemicals, and weathering. They are permanent as a character and have permanent, wet, snowy, or dampness. Airport buildings constructed of Natco are a joy to use.

✓ LOW DEPRECIATION

Natco Structural Clay Tile may be truly called "Built to Last" in the Engineering Books. Buildings built of it are highly resistant to all the agencies of deterioration and decay. Depreciation is usually figured at half a penny per square foot.

✓ LOW MAINTENANCE

Because of Natco Structural Clay Tile is permanent as a character and is free, and never decays or deteriorates, painting, polishing and repairs work, especially with most forms of construction, are reduced to an absolute minimum.

✓ DECREASED HEAT LOSS

All Natco Structural Clay Tile have dead air spaces, which reduce high building values. The process of heat and cold is reduced to a great degree. This feature is tremendously important in all buildings, and especially in a kitchen.

Write, wire, or consult the nearest office, for full details. Our engineering department will gladly cooperate with architects and contractors in airport planning and building.

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Fulton Building, Pittsburgh, Pa.

I am considering a _____

to be built of _____

Quantity of material—600,000, 1,000,000, 1,500,000

Please send literature:

Name _____

Street _____

City _____

State _____

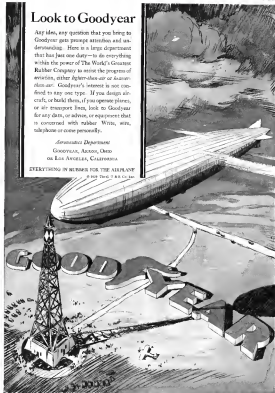
Look to Goodyear

Any idea, any question that you bring to Goodyear gets prompt attention and understanding. Here is a large department that has just one duty—to do everything within the power of The World's Greatest Rubber Company to assist the progress of aviation, either lighter-than-air or heavier-than-air. Goodyear's interest is not confined to any one type. If you design aircraft, or build them, if you operate planes, or air transport lines, look to Goodyear for any data, or advice, or equipment that is concerned with rubber. Write, wire, tele phone or come personally.

Aeronautics Department
GOODYEAR, Akron, Ohio
or LOS ANGELES, California

EVERYTHING IN READY FOR THE AIRPLANE

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DISTINGUISHED FROM ALL OTHERS BY PERFORMANCE

On the take-off . . . in the air . . . slipping into the small field . . . no matter what the task or condition may be, Spartan is distinguished from all others by performance.

The new Spartan C-315 comes from a background of years filled with scientific research, of experiment involving rebuilding, testing and re-designing. The result is an airplane designed and built to give faithful, uninterrupted service, amply powered by the Wright "Whispering Five" and scientifically carried from the standpoint of modern, progressive engineering. In no other airplane is craftsmanship more apparent than in the new Spartan. A rigid manufacturing policy

which places quality before quantity insures final perfection of every detail inherent stability is a characteristic upon which Spartan owners may rely for accurate, unfaltering flight under any condition. And, finally, lack of Spartan is the security of an organization possessing both the purpose and resources to remain in the forefront of American airplane manufacturers.

Progressive airplane dealers will recognize in Spartan outstanding characteristics which appeal to the prospective buyer . . . and in the Spartan sales franchise an opportunity for a sound business connection.

WRITE FOR INFORMATION
AND DESCRIPTIVE LITERATURE

SPARTAN AIRCRAFT COMPANY
TULSA - OKLAHOMA



DESIGNED TO BE SAFE . . . BUILT TO STAY SAFE

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AVIATION INDUSTRY THAT USES **SKF** BEARINGS
PRATT & WHITNEY AIRCRAFT CO.



One Thing Counts Above All in the Air—Dependability
—and Pratt & Whitney Uses **SKF**

THERE'S one thing that eyes high when you're in the air... dependability. It's been said over and over again but it means more and more each day as aviation marches forward to greater importance in transportation. That's the basic reason underlying the universal acceptance of **SKF**... the highest priced bearing in the world... by the industry. Long a leader in the field, Pratt & Whitney

has been a consistent user of **SKF** Bearings for its motors. On the "Wasp" they are to be found providing the maximum protection for crankshaft, propeller, supercharger, rocker arm and governor drive. Precision, ruggedness, long life and no adjustment... these are outstanding features of **SKF** which have materially contributed to the success of the "Wasp" in its many achievements.

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AXELSON AIRPLANE ENGINES

ALOFT ABOVE FOUR CONTINENTS DAILY!



Type "F-30"
3-place
Daily Amphibian



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"SAVOIA-MARCHETTI" AIRCRAFT
WILL BE SENT ON REQUEST

TWELVE YEARS' successful building—twelve millions of miles of safe commercial transport flying...Savoia-Marchetti flying boats and amphibians as produced today are aviation's most striking example of "the survival of the fittest".

Daily passenger and mail services using the Savoia-Marchetti 14-passenger type S-40 are now linking important centers of Europe, North Africa and Asia.

New American cities, located on waterways, are also taking advantage of their natural landing facilities, with Savoia-Marchetti ships, for these famous flying boats and amphibians are being produced in the United States in 3 units, for transport, mail, aerial service and private flying.

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attests these facts by its use of

Pedrick
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PISTON RINGS

When the Air Mail Division, U. S. Post Office Department, inaugurated the Air Mail Service, PEDRICK was chosen as piston ring equipment. The use of PEDRICK by the Government operated air lines was continued right up to the time when private concern took over the service. Now many of the presently operated lines have standardized on PEDRICK.

This record of long-continued service in Air Mail planes surely demonstrates the dependability of PEDRICK to an extent that no single flight, however long, could prove. PEDRICK holds compression and prevents oil pumping (spark plug fouling)—and continues to do so indefinitely.

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THE GLENN L. MARTIN CO.
Builder of Quality Aircraft since 1909
BALTIMORE, MARYLAND

AVIATION

THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

A McGraw-Hill Publication — ESTABLISHED 1918

EDWARD P. WARNER, Editor

VOLUME 1 . . . October 5, 1929 . . . NUMBER 10



Introduction

THE TIME HAS PASSED when any man can carry in mind all of the pertinent information upon aeronautical development. The unassisted experience demands continuous classification and interpretation if it is to be of use. Both the figures and their interpretation must be brought up to date at intervals of only a few months, or they lose all but historical interest. Only a periodical can keep pace with the flux of the industry and of the aircraft operation. We have undertaken in the present issue to present a selection of the most important data.

Statistics do not make freely reading, but for the reader with imagination they need little interpretative comment to tell a realistic story. The whole content record of the performance of the aircraft is written in three or four lines that sweep across the page, with a sharp twist upward beginning in 1927. Another chart, and the tables that accompany it, tell the tale of growing military and naval confidence in aeronomics and growing dependence upon aviation in the armed services, and of the desperate struggle to find and to keep in the service properly qualified living personnel in adequate numbers. Records of the aeronautical apprehensions of foreign countries interpret in terms of their mutual distrust and slow changing economic conditions. Tables and charts such as those here presented are the foundations upon which the plans of business are laid.

Not said the attempt is made to compile such material in it realized what a diversity of conflicting information exists. Based upon operations within the United States there sometimes appear two distinctly different sets of data, both from apparently authentic sources and apparently representing the same thing. When foreign performances are to be assigned, the conflict becomes appalling. The figures here given have in many cases been based upon a sifting of several sources and a rejection of all but one. In a few

instances, where two or more apparently equally reliable sets of statistics differ from each other, but only by relatively little, their average has been used.

Most of these figures have naturally been drawn from official sources. To those who have given freely of assistance in searching and arranging data, and especially to the officials of the Aeronautics Branch of the Department of Commerce and to those of the Aeronautical Chamber of Commerce, we are glad to express our indebtedness. Other government departments have also helped in varying degrees, and the publications of foreign governments have been relied upon extensively. Among the published volumes found especially useful, others as original sources of material or for checking each other and against official reports, special mention should be made of the yearbooks of the Aeronautical Chamber of Commerce, "The Air Annual of the British Empire," the several volumes of "L'Année Aéronautique" compiled by Hirschman and Delfin, and "Die Jahrbuch der Luftverkehr" compiled by the German official foreign documents the several reports on the progress of civil aviation prepared by the British Air Ministry has been particularly helpful.

ALTHOUGH EVERY EFFORT has been made to attain accuracy, it is not to be expected, particularly in view of the conflict of testimony previously mentioned, that perfection would be reached or very nearly approached. We shall be grateful for information of any errors and glad to correct in an early issue any that may be of a substantial nature or seriously misleading. Authenticity obviously cannot be guaranteed, especially in the first publication of the kind and where so much historical material is contained.

This is the first statistical number of AVIATION, but it will not be the last. Suggestions for modifications in content, or for interesting and valuable additions to the list of material now presented, will be gratefully received.

Production AND License Data

Classification of Licensed and Identified Aircraft as of March 30, 1937

Grouped by existing number. Source: Aeronautical Chamber of Commerce analysis. Where applicable, figures were obtained from the listing.

	Closed-Cycle Land Planes											Open-Cycle Land Planes					Toughness and Amphibians				
	1	2	3	4	5	6	7	8	9	10	11 and Total	1	2	3 and Total	4	5	6 and Total				
NEW ENGLAND																					
New Hampshire																					
Maine																					
Vermont																					
Massachusetts																					
Rhode Island																					
Connecticut																					
MIDDLE ATLANTIC																					
New York																					
New Jersey																					
Pennsylvania																					
EAST NORTH CENTRAL																					
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Indiana																					
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Analysis of Airplane License Data by Makes (as of approximately July 1, 1929)

[illegible]

Analysis of Engine License Data by Makes (as of approximately July 1, 1929)

[illegible]

Exact Substitutions of these tables are near 400

Aircraft Licenses by Make

[illegible]

duces. There are other cases, however, in which planes are located only when they reach the dealer or when they pass into the hands of the final owner. In any event, machines shipped immediately for export are unlikely to have licenses. All of these factors must be borne in mind in interpreting the license figures, but they remain the best available index for a classification of planes in service and of the new machines being produced in the United States.

The claimant here, as in the more extended table on page 166, has been made entirely on the basis of trade names without reference to financial alliances. If the totals of outstanding licenses as of the July 15, 1934 be taken for the several groups of companies that have recently been merged, the aggregate figure for the Corbin-Wright Corporation is 1,021 licenses, that for the United States Rubber Company 1,000, for Goodyear 150, and for the Fairchild Company 235. The five largest manufacturing groups are responsible for the aggregate for 2,639 licenses, or 62 per cent of the total number then licensed. Of the new licenses issued from April 20 to August 31, inclusive, they account for 65 per cent. The corresponding figure for the automobile industry, based on new registrations only, would be something over 60 per cent for the five largest manufacturers, and 75 per cent for General Motors, for example, as a single company.

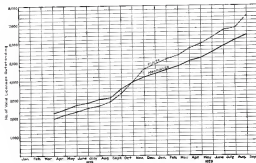
The geographical distribution of the planes was also geographically important. Although in many cases the actual location of the accident was correctly represented by the tables on pages 690 and 697 there were some exceptions. More planes, for example, are registered below the state of the origin of a distribution than may operate through branches in states other than that in which he has his headquarters. Another example applies especially to the large transport machines and airliners. The predominance of registrations of transport airliners in New York, California, Michigan, and two or three other states is partly accounted for by their being licensed at the administrative headquarters of the large transport companies operating there.

Licenses Recently Granted, by States

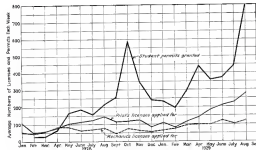
[illegible]

Tables are, together with those in the two preceding pages, most be taken to exactly what they are; neither more nor less. The large tables represent the number of airplanes licensed by the Department of Commerce, as included in a list compiled by the Aeronautical Chamber of Commerce on July 13, 1929, and appearing in the *Official Register of Aircraft* for that year. The part of Table 10 that is in large type is taken from the Aeronautical Chamber's weekly lists of licenses granted from April 30 to Sept. 1, inclusive. Assuming accurate tabulation, the figures would correspond to the number of machines of each type in service in each state, minus the number of airplanes that are in the process of being built. The small type in the table lists the number of one-time designs or of planes being built in each small community that they would in any case appear in the miscellaneous group in the above tabulation. That has been so true in recent months that in a number of cases the number of airplanes in the table is the newly identified planes were found to be of any of the makes apparently listed in the table here presented.

The definition of "planes in service" varies somewhat with the manufacturer. In some cases all machines are located as built, and that is an increasingly common practice. In these instances, the figures on total new business would correspond accurately with total new

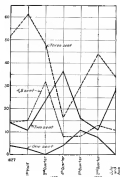


Physics and Mechanics' Licenses in Force

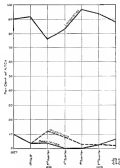
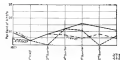


Personal License Applied for Weekly

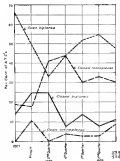
Trend of Design AS SHOWN IN Approved Type Certificates



Designs Grouped by Seating Capacity



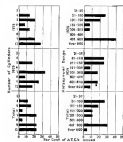
Proportionate Distribution of Designs by General Type



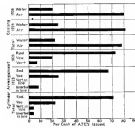
Engines and Propellers

Period	No. of ATC's	Radial		Engine		Propeller		Other		Total	
		No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
1927	11	10	90.9	1	9.1	0	0	0	0	11	100
1928	11	10	90.9	1	9.1	0	0	0	0	11	100
1929	11	10	90.9	1	9.1	0	0	0	0	11	100
1930	11	10	90.9	1	9.1	0	0	0	0	11	100
1931	11	10	90.9	1	9.1	0	0	0	0	11	100
1932	11	10	90.9	1	9.1	0	0	0	0	11	100
1933	11	10	90.9	1	9.1	0	0	0	0	11	100
1934	11	10	90.9	1	9.1	0	0	0	0	11	100
1935	11	10	90.9	1	9.1	0	0	0	0	11	100
Total	11	10	90.9	1	9.1	0	0	0	0	11	100

Period	No. of ATC's	Radial		Engine		Propeller		Other		Total	
		No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
1927	11	10	90.9	1	9.1	0	0	0	0	11	100
1928	11	10	90.9	1	9.1	0	0	0	0	11	100
1929	11	10	90.9	1	9.1	0	0	0	0	11	100
1930	11	10	90.9	1	9.1	0	0	0	0	11	100
1931	11	10	90.9	1	9.1	0	0	0	0	11	100
1932	11	10	90.9	1	9.1	0	0	0	0	11	100
1933	11	10	90.9	1	9.1	0	0	0	0	11	100
1934	11	10	90.9	1	9.1	0	0	0	0	11	100
1935	11	10	90.9	1	9.1	0	0	0	0	11	100
Total	11	10	90.9	1	9.1	0	0	0	0	11	100



Grouping of Engine Designs by Type and Power



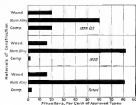
Cylinder Arrangement and Cooling of Engines

AN ANALYSIS of the group of airplanes, engines and propellers having approved type certificates is here presented in an effort to show the general tendencies of design. In each case the approved designs for two or more periods have been classified as to type and the numbers and per cent of the totals for each period given in tabular form. The graphs and bar charts show the variation in per cent of the total of each type for each period.

In the airplane designs table on page 701, the approved designs are divided into seven groups on the basis of the period during which they were issued. Each of these groups is broken down into several classes on the basis of type, and in the case of each type the percentage of the total number in the group is given. These percentages are plotted graphically against the various periods of time on page 702.

The same principle of analysis has been applied to the engine designs that have received approved type certificates up to July of this year. On account of the limited number of engines approved thus far it was thought advisable to divide these designs into only two groups as indicated above. For this reason the percentages of each type for each group have been shown by means of bar charts.

A similar analysis of the type certificates issued for propellers also has been made and, in the case of the engines, two general groups have been made on the basis of size. A bar chart showing the percentages of approved types is shown below, while the table from which it is derived is given above.



Propeller Grouping by Materials of Construction

DEVELOPMENT OF

Air Transport Activities IN THE United States

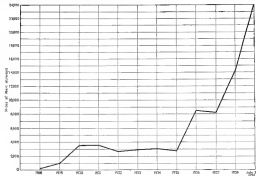
THE effects of the Air Commerce Act, of the Contract Air Mail Act, and of the measure extending the contract privilege to foreign air mail, are very apparent from the long-term graph on this page. The first real stimulus to the laying of routes and the corresponding expansion of the carrier came in 1925 with the passage of the Contract Air Mail Act. In 1935 and in the present year a substantial part of the increase has been due to the laying of contracts for foreign mail. Roughly speaking, the scope of the air mail service doubled in 1935, doubled again in 1936 and will double yet again in the present year.

At the same time the increase of non-mail carrying operations is marked. At the end of May, 1935 more than 80 per cent of the daily scheduled mileage was

made under mail contracts. A year later the proportion had dropped to almost exactly two-thirds, and at the end of July the aggregate daily mileage completely independent of Post-Office support was almost equal to the total for all operations. Further analysis previously.

Over the period covered by the chart the ratio between route mileage and daily scheduled mileage has remained almost constant at an average of a little less than 1.2 round trips per day over all the routes. Few of these are as yet being operated intensively.

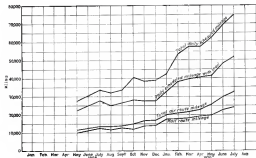
Although there was a temporary check to the increase of total route mileage in 1937 the increase is growing, operation was pronounced. It was during 1937 that the transcontinental air mail was turned over to the Post Office department to private contractors.



Mileage of American Air Mail Routes

Miles of U. S. Mail Airways

Dec. 31, 1924	1,110
Dec. 31, 1925	1,180
Dec. 31, 1926	1,260
Dec. 31, 1927	1,340
Dec. 31, 1928	1,420
Dec. 31, 1929	1,500
Dec. 31, 1930	1,580
Dec. 31, 1931	1,660
Dec. 31, 1932	1,740
Dec. 31, 1933	1,820
Dec. 31, 1934	1,900
Dec. 31, 1935	1,980
Dec. 31, 1936	2,060
Dec. 31, 1937	2,140



Recent Increases in Route Mileage and Distance Flown in American Air Transport

Airway and Operation Mileage for Last 14 Months

	Miles of Air Service	Total Miles of Service	Airway Miles Estimated Daily with Mail	Total Airway Miles Estimated Daily
May 19 1934	10,800	10,800	11,400	27,400
July 14 1935	11,171	19,249	13,644	32,117
Aug. 14 1934	11,521	12,071	13,100	10,940
Sept. 19 1934	11,717	11,000	14,100	11,170
Oct. 14 1934	12,117	14,000	15,100	10,810
Nov. 19 1934	12,419	14,400	16,100	10,900
Dec. 24 1934	12,719	14,600	17,100	10,900
Jan. 24 1935	12,800	15,000	18,100	11,000
Feb. 19 1935	12,900	15,100	19,100	11,100
Mar. 20 1935	13,000	15,200	20,100	11,200
Apr. 20 1935	13,100	15,300	21,100	11,300
May 10 1935	13,200	15,400	22,100	11,400
June 10 1935	13,300	15,500	23,100	11,500
July 10 1935	13,400	15,600	24,100	11,600

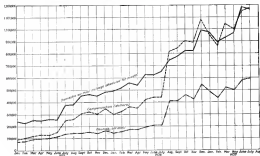
UNITED STATES *Air Mail Operations* AND *Traffic*

THE curves of air transport development, and especially those for the air mail service, have to be read in terms of legislative history. Thus for several years in the early part of the present decade the air mail planes were loaded with regular first-class mail at no extra charge, and the public had no direct control over the weight carried. The sharp drop of postage in 1925 corresponds to the suspension of the special air mail stamp and the extra fee. The equally abrupt

rise in August, 1928, came at the time of the lowering of the charge from ten cents per half ounce to five cents per ounce.

Ever since the passage of 1927 the curves of weight of mail carried and of compensation paid by the contractors have been almost interchangeable, weight being plotted on different scales. Compensation has very much outstripped weight.

The compensation per airplane mile has been more



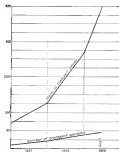
Development of Annual Service

Year	Air Mail Weight Subsidies	Air Mail Weight Tons	Total Weight Tons	Weight of Mail Tons
1917	43,000	10,000	40	10,000
1918	144,444	148,000	71	148,000
1919	115,744	148,000	80	148,000
1920	1,811,000	1,000,000	40	1,130,000
1921	1,029,100	1,000,000	40	1,130,000
1922	1,444,444	1,000,000	80	1,130,000
1923	1,000,000	1,000,000	40	1,130,000
1924	1,000,000	1,000,000	40	1,130,000
1925	2,444,444	1,000,000	80	1,130,000
1926	1,000,000	1,000,000	40	1,130,000
1927	1,000,000	1,000,000	40	1,130,000
1928	1,000,000	1,000,000	40	1,130,000

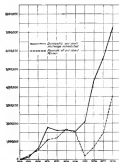
Weight of mail carried in 1925 was 1,000,000 lbs. (454 tons) and in 1928 was 1,000,000 lbs. (454 tons). The weight of mail carried in 1925 was 1,000,000 lbs. (454 tons) and in 1928 was 1,000,000 lbs. (454 tons).

According: Starting with an average of less than five cents per mile at the beginning of 1929, it increased to over \$1.00 per mile when the rates were lowered a year ago. Since then it has remained close to that figure. Although air mail postage and subsidies are obviously two quite different things it is interesting to note that the subsidies paid by several European governments average just about \$1.00 per airplane mile with no error in the line of excess postage.

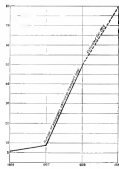
Although there are no traffic figures in ton-miles and passenger-miles available for American operations, a general analysis of the transport business can be made in terms of passengers carried and pounds of mail. The express business has so far not been large enough to cut an important figure in the distribution. The number of passengers in 1926 was 6,000, an aggregate weight of about 110,000 pounds as against 750,000 pounds of air mail. As the length of voyage for an average passenger probably was not more than one-eighth of that for the average letter, the actual traffic in that year was probably about sixteen per cent passenger, 84 per cent mail. On the same basis of calculation the proportion of passenger business fell back to about twelve per cent in 1927, increased to approximately one-fourth of the total air transport business in 1928 and seems likely to be at least as large a part of the total for the present year.



Total of Transport Operators and Equipment



10 Years of Air Mail Progress

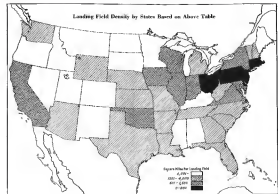


U. S. Passenger Traffic
(line in thousands of passengers)

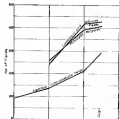
Airport AND Landing Field DISTRIBUTION IN THE UNITED STATES

Airports (June 30, 1929)

STATE	Permitted	Unauthorized	Private	Public	Army	NAVY	State	Permitted	Unauthorized	Private	Public	Army	NAVY	State
Alabama	2	4	0	0	0	0	12	6,584	0	0	0	0	0	12
Arizona	0	0	0	0	0	0	12	1,000	0	0	0	0	0	12
Arkansas	0	0	0	0	0	0	11	3,100	0	0	0	0	0	11
California	10	41	15	15	0	0	15	1,145	0	0	0	0	0	15
Colorado	0	0	0	0	0	0	13	4,100	0	0	0	0	0	13
Connecticut	4	1	0	0	0	0	10	100	0	0	0	0	0	10
Delaware	0	0	0	0	0	0	10	100	0	0	0	0	0	10
District of Columbia	0	0	0	0	0	0	10	100	0	0	0	0	0	10
Florida	10	10	0	0	0	0	10	1,100	0	0	0	0	0	10
Georgia	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10
Idaho	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10
Illinois	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10
Indiana	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10
Iowa	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10
Kansas	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10
Kentucky	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10
Louisiana	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10
Maine	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10
Maryland	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10
Massachusetts	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10
Michigan	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10
Minnesota	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10
Mississippi	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10
Missouri	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10
Montana	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10
Nebraska	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10
Nevada	0	0	0	0	0	0	10	1,100	0	0	0	0	0	10



IN EXAMINING the map on the opposite page, it is of course apparent that landing fields are established on each most frequently, other things being equal, where there are known possibilities of landing upon a natural terrain. In New England, for example, artificially prepared and surfaced landing fields are relatively much more necessary for safe flying than in the prairie states. In any case, however, the standard of one landed square miles per landing field seems a modest one to aim at. To have a landing field always within ten miles, wherever a plane might be flying, is, however, something that can be attained, as has been pointed out, at least one field for every two hundred square miles of area, a density so far attained only in the District of Columbia and in the smallest state in the Union. In states where popular interest has been particularly great, and where the habit of municipal business enterprise is established, as in many parts of the West, the municipal field far outnumber the commercial ones. In several picturesque states, on the other hand, commercial fields outnumber those provided by the government at the rate of two to one or more.



Total of Airports and Deps. of Commerce Fields Established

WORK OF National Advisory Committee FOR AERONAUTICS

APPROPRIATIONS AND EXPENDITURES OF NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS, AUGUST 31, 1929

Fiscal Year	Total Appropriations	Expenditures	Unexpended Balance
1921	\$1,000,000.00	\$1,000,000.00	\$0.00
1922	\$1,000,000.00	\$1,000,000.00	\$0.00
1923	\$1,000,000.00	\$1,000,000.00	\$0.00
1924	\$1,000,000.00	\$1,000,000.00	\$0.00
1925	\$1,000,000.00	\$1,000,000.00	\$0.00
1926	\$1,000,000.00	\$1,000,000.00	\$0.00
1927	\$1,000,000.00	\$1,000,000.00	\$0.00
1928	\$1,000,000.00	\$1,000,000.00	\$0.00
1929	\$1,000,000.00	\$1,000,000.00	\$0.00

*Unexpended balance includes unexpended balance of California relief fund (annual appropriation) and other funds.

PERCENTAGES OF NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS, AUGUST 31, 1929

Fiscal Year	Terminal Reports	Technical Reports	Unexpended Balance	Total Costs
1921	11	11	11	33
1922	11	11	11	33
1923	11	11	11	33
1924	11	11	11	33
1925	11	11	11	33
1926	11	11	11	33
1927	11	11	11	33
1928	11	11	11	33
1929	11	11	11	33

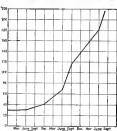
Fiscal Year	Terminal Reports	Technical Reports	Unexpended Balance	Total Costs
1921	11	11	11	33
1922	11	11	11	33
1923	11	11	11	33
1924	11	11	11	33
1925	11	11	11	33
1926	11	11	11	33
1927	11	11	11	33
1928	11	11	11	33
1929	11	11	11	33

*No data.

Weather Bureau

Special Observations for Weather Bureau Civil Airports

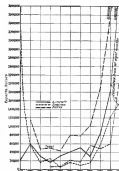
Fiscal Year	Terminal Reports	Technical Reports	Unexpended Balance	Total Costs
1921	11	11	11	33
1922	11	11	11	33
1923	11	11	11	33
1924	11	11	11	33
1925	11	11	11	33
1926	11	11	11	33
1927	11	11	11	33
1928	11	11	11	33
1929	11	11	11	33



Special Weather Bureau Observing Stations Operating for Airway Service

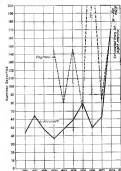
AMERICAN EXPORT TRADE IN Aeronautical Equipment

THE PROGRESS of the product of the American aircraft industry which has been exported has been increasing gradually over the last three years, as shown by the chart given herewith. In 1927 a trifle over three per cent of the production was abroad. In 1928 the proportion had risen to four per cent, and the present year it seems likely to be nearly ten per cent. Prior to 1927, when but little serious effort was being made to develop permanent export markets, the foreign trade in aeronautical products was exceedingly unsteady, and was made up largely of war surplus equipment. In 1922, for example, the average value of the airplanes exported was only \$5,000, while the corresponding figure for the first eight months of the present year is about \$17,000. The influence of war surpluses is particularly evident in the irregularity of the curve of engine exports and in the low average value. For the 257 engines shipped abroad in 1926 it was only \$3,000 per unit. In 1927 the average valuation on engines exported had increased to about \$6,000. Since then it has again been falling, in correspondence with the decrease of domestic

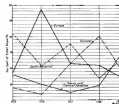


Total Value of Aeronautical Exports

Note: The curves for exports and production are interpolated on the Export - 25 in the latter curve which starts in 1928.



Number of Aircraft and Engines Shipped Abroad Each Year



Percentage Distribution of Exports by Geographical Areas

Aircraft and Aircraft Engine Exports (Value in Dollars)

(Amounts include only up to 1927 and 1928)

Countries	1922	1923	1924	1925	1926	1927	1928	Total
Canada and Newfoundland	6,500	6,842	15,432	42,491	15,430	10,820	1,000,000	1,082,000
Cuba	—	—	2,022	10,000	14,000	51	31,200	61,200
Domestic Available	—	—	6,000	17,000	—	16,000	11,247	50,247
Guatemala	—	—	—	—	—	—	—	—
Haiti	—	—	—	—	—	—	—	—
Mexico	—	—	21,240	1,000,000	5,000	10,000	14,000	1,030,240
Panama	—	—	—	—	—	—	—	—
Salvador	—	—	2,022	6,700	6,000	6,000	—	17,722
Mexico and Central America (including inter-American)	—	—	23,262	1,016,700	11,000	16,000	100,000	1,062,962
Japan	—	—	30,000	14,100	17,000	10,000	10,000	71,100
Brazil	—	—	17,000	10,000	14,000	10,000	10,000	55,000
China	—	—	6,000	10,000	10,000	10,000	10,000	46,000
Colombia	—	—	—	—	—	—	—	—
France	—	—	30,000	10,000	10,000	10,000	10,000	70,000
Germany	—	—	—	—	—	—	—	—
Italy	—	—	—	—	—	—	—	—
Netherlands	—	—	—	—	—	—	—	—
Poland and Czechoslovakia	—	—	—	—	—	—	—	—
Spain	—	—	—	—	—	—	—	—
Sweden	—	—	—	—	—	—	—	—
United Kingdom	—	—	—	—	—	—	—	—
Europe (including inter-American)	—	—	67,000	34,100	51,000	40,000	40,000	192,100
China	—	—	—	—	—	—	—	—
Domestic	—	—	—	—	—	—	—	—
Japan	—	—	—	—	—	—	—	—
Other	—	—	—	—	—	—	—	—
Asia (including inter-American)	—	—	—	—	—	—	—	—
Total (including inter-American)	6,500	6,842	41,492	76,491	26,430	26,820	1,040,000	1,142,000

engine prices due to enlarged production, and the average for the first eight months of 1929 was only a little over \$4,000 per power plant.

Since the total exports are still so small that a single large order may greatly affect the percentage distribution, their allocation among the continents is still highly variable from year to year. The curves drawn over the last five years make evident, however, the gradually increasing importance of the American market and the decrease in relative significance of the exports to Europe. In each of the last two years more than two-thirds of the total exports (in dollars) have gone to the western hemisphere. Rapidly increasing shipments to Mexico are primarily responsible for the increasing relative importance of the group that includes that country and Central America.

The figures for the first eight months of 1929 have been included in the charts, but they were omitted too late for complete analysis for the table of exports by countries. The exports to Mexico alone between January 1 and September 1 aggregated \$1,500,000, almost as much as the entire export trade in aircraft with the whole world for the year 1927. Other conspicuously large customers of American aircraft products in the first eight months of 1929 were Chile, which took \$500,225, mostly in complete airplanes, and Japan. The exports to Japan for the first eight months exceeded the total of trade with that country for the previous seven years. While the Canadian business amounted to more than one and a half million dollars, and for the whole

year is almost sure to be above the previous record figures of 1926, the proportion of the total business done with Canada has sharply decreased.

A substantial proportion of the exports to the countries of the western hemisphere is accounted for by the shipment of planes, later to be operated by transport lines under American management.

National Aeronautical Association Activities

(To September 30, 1929)

Membership at end of year (approx.)	1925	1926	1927	1928	1929
Organized up to end of year	1,000	1,000	5,000	10,000	15,000
No. of P. A. C. members at end of year	—	—	—	—	—
No. of P. A. C. members at end of year	—	—	—	—	—
No. of P. A. C. members at end of year	—	—	—	—	—
No. of P. A. C. members at end of year	—	—	—	—	—
No. of P. A. C. members at end of year	—	—	—	—	—

1. For September 1, 1929; 2. For September 1, 1929; 3. For September 1, 1929.

The F. A. I. license referred to in the table of N. A. A. activities is granted once and for all, and each license represents a new pilot potentially qualified for aerial competition. The N. A. A. licenses are annual, and must be renewed each year by all pilots wishing to engage in contests. The number of pilots mentioned in the table is a fair measure of the total amount of surplus competition, as licensed pilots are only permitted to compete in sanctioned events.

AMERICAN *Military* AND *Naval* DEVELOPMENT

Army Air Corps

Personnel strength at end of year

	1922	1923	1924	1925	1926	1927	1928
Officers	760	729	860	990	960	1,041	1,060
Enlisted men	5,526	10,160	5,126	5,152	5,126	5,375	5,320
Qualification plans (includes it and others)	526	565	525	605	594	712	627
No. of planes in use Dec. 31			1,531	437	647	868	1,000
Support officers needed and assigned on plane					670	1,191	1,148
Flying hours	12,214	41,351	12,314	15,511	170,460	168,766	151,911
Aircraft purchased (during fiscal year)	151	91	29	127	176	311	411

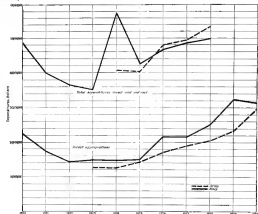
Naval Aeronautics

Naval and Marine Corps flying personnel at end of fiscal year

	1922	1923	1924	1925	1926	1927	1928
Naval officers pilots	114	126	126	145	451	417	440
Naval enlisted pilots	11	251	113	58	51	186	221
Naval Naval pilots	401	601	440	403	300	330	330
Marine Corps officers pilots	40	50	40	50	51	51	51
Marine Corps enlisted pilots	41	41	41	41	41	41	41
Naval flying hours during fiscal year	10,000	15,500	10,000	15,500	15,500	15,500	112,200
No. of airplanes in use at end of fiscal year	75	75	75	75	75	75	75
No. of aircraft in use at end of fiscal year	75	75	75	75	75	75	75
No. of planes purchased during fiscal year	11	11	11	11	11	11	11

* Actual data for Navy flying hours from October 1 to December 31.

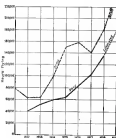
* Estimated as well as observed figures excluded from this total.



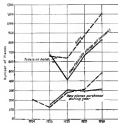
Aeronautical Appropriations

THE CHART of Army and Navy appropriations does not correspond to the actual outlay from the appropriations of the several years. To give the figures in these terms would be misleading, as both services have at times been specifically authorized to incur contracts in excess of current appropriations and charge the obligations against future years. The sums allotted are, as nearly as they could be determined, those newly available for obligation in each fiscal year. The exact allocation at its source is a little vague, as legislative authorization to spend the next year's money has not always been used to its full extent, but they represent better than any other statement that could be secured the most accurate picture of the Army and Navy as proposed.

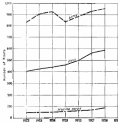
The indirect expenditures include the pay of officers and men and all other items directly related to aeronautics. The peak in the Navy figure for 1934, for example, represents construction costs on the aircraft-carrying ships *Saratoga* and *Lexington*. These figures also include the book value of transfers of war surplus stores to current use. The general substance in appropriations and in activities which began with the meetings of the President's aircraft board in 1925 and the passage of the five-year aircraft program in the following year is evident in the charts.



Total Annual Flying Time in Airplanes



Army and Navy Flying Equipment



Total of Qualified Service Pilots

Annual Airplane Mileage in Air Transport

17. *Chlorophyll a* (mg/g)

	1970	1971	1972	1973	1974	1975	1976	1977	1978
Argentina					265	229	411	349	45
Bolivia							68	117	28
Colombia		14	118	184	148	197	367	589	19
Costa Rica					129	175	112	124	23
Czechoslovakia						122	127	32	30
Denmark						53	18	405	14
Ecuador						3,619	3,146	4,474	1,000
Germany	239	1,467	1,738	1,914	2,044	2,075	2,070	2,089	1,747
Greece	100	1,000	740	440	904	840	840	840	1,424
United Kingdom	444	444	444	747	776	862	840	840	1,424
Italy							840	840	1,424
Japan							840	840	1,424
U.S.S.R.							840	840	1,424
France							840	840	1,424
Sweden							840	840	1,424
Switzerland							840	840	1,424
Yugoslavia							840	840	1,424
Other							840	840	1,424
Total							840	840	1,424

Passenger Traffic in Passenger-Miles

(Timoteus 2:14)

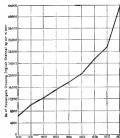
	1979	1981	1983	1985	1986	1987	1988	1989
Flares	582	3,382	2,241	2,868	3,338	3,973	4,702	4,818
Coronae	745	1,360	3,300	3,220	2,220	3,031	3,004	14,370
Great Britain	1,361	1,576	1,838	3,000	1,239	1,871	3,126	4,833
Italy						436	2,970	
Top 1000 stations				767	1,100	1,359	3,868	
Notes			85	180	30.0	1.34	1.134	2.894

Express and Mail Traffic in Two Miles

	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
Power	24,180	16,430	112,800	124,000	114,000	802,500	380,500	428,800	470,500	470,500
Gasoline	2,390	800	11,000	11,000	24,400	100,000	212,800	454,000	381,000	381,000
Other Electric	50,000	6,000	47,800	54,300	504,700	1,024,800	1,039,100	1,061,900	1,061,900	1,061,900
Utility						45,000	45,000	45,000	45,000	45,000
The McGraw-Hill Companies						174,000	174,000	174,000	174,000	174,000
Total			6,800		42,800	20,000	38,800	10,000	14,000	14,000



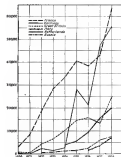
Left: Total Passenger Traffic on European Air Services in Passenger Miles per Year. Below: Aerial Passenger Traffic Across English Channel.



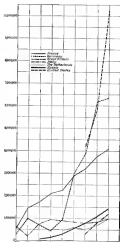
AVIATION
October 1, 1977

Foreign

AIR TRANSPORT



Above: Express and Mail Traffic in Ten Miles
 Right: Total Mailage Flown in Air Transport



Statistics of Civil Air Transportation (from the Department of Commerce)

[illegible]

Foreign News Briefs

A pilot and navigator will be used at Munich, Germany, to make regular observations of upper air conditions.

Passenger traffic at Turin (Stavali) Airport dropped about 21 per cent during the first half of this year. Volume of baggage dropped about 21 per cent, while freight increased about 2 per cent. Road weather and obstruction of several lines on account of decreased velocity are blamed for this. There was considerable improvement during July.

Imperial Airways has definitely abandoned other than three-engined planes on its cross-Channel passenger services.

Additional firms are said to be involved in the engine negotiations which already have included Societe Lorraine, Societe Anvers, Siquem, Delage and Arrols & Hainaut, in Paris.

The Argus Motor Works, of Berlin, is reported to have developed a new inverted inline-engine, air-cooled, six-cylinder engine, which develops 66 h.p. at 1,600 r.p.m. Each cylinder has two overhead valves. All valves and push rods are enclosed.

A bid is being entered among governments of the 26 Mexican states for the purchase of supplies for the Mexican Navy.

Aeromarine Transport Corporation is to operate three times a week a group of trips to St. Vincent, over its Mexico City-St. Vincent line on account of demand for passenger and mail accommodations.

Improvements on the Junkers Diesel engine, designated as the "S. L. 2," enable it to develop 150 h.p. and fuel consumption has been lowered.

During some of the first years of operation, the Czechoslovakian state airlines have not had a serious accident. During 1938, there were two fatal accidents. The Czechoslovakian Air Travel Company has 1938, its first year of operation, without any accidents, but during the first half of this year had one fatal crash.

A new three-cylinder type of engine has been developed by J. H. Houdmann, a Stockholm civil engineer. An Anglo-Swedish company has been organized to exploit it.

Northern Air Lines has discontinued transportation of passengers as its Manchester-Dublin and Belfast-Dublin routes mail tri-engined planes have been modified. Mail and freight will be carried across the Irish Sea on bi-motors.

Following acquisition of Capt. Alfred Albrecht, commander of the 41st attempt to fly from London to North America by way of Ireland and Greenland, that his engine developed trouble, an investigation is being made to determine its exact condition.

In its attempt to cross the English Channel mail and passenger service to America next year, it was stated at

the annual meeting of Imperial Airways in London recently. This would bring England and Australia within sixteen days of each other.

A new eight-passenger tri-motor of the Compagnie Generale des Etablissements recently has been flown from Paris to Madrid in 5 hr. 11 min. Jules Vernekin was the pilot.

A Short Caters flying boat ordered by the French Government has been delivered.

During the week ending Sept. 7 a total of about 1,611 passengers were carried across the English Channel. About 1,000 of these were transported by Imperial Airways.

The Ray-Roy Aviation Company of Hong Kong, China, has started a tri-motor flying club and is looking for an instructor. Salary has been set at about \$9,000.

Recent agreement between Poland and Germany makes possible German operations over Poland and landings at certain points.

A chair of aviation has been established by the University of Paris at the College of France.

Because of a tendency for students at Cambridge University among their new planes to cut classes, an order has been issued forbidding carrying flights without proper permission.

General Bache, Italian Air Minister, is preparing a flight from Rome to this country, with himself as chief pilot.

Because of the general lack of suitable landing fields in the Azores, on account of which the island has been called the "island of aviators," Portugal is making steps to install an airport system there.

During the last six years, 300,000 lbs. have been flown 3,956 passengers from here and 44,211 tons of merchandise have been transported on the air lines serving the interior of Spain, according to the Department of Commerce.

Night air mail service was started on Oct. 1 by K. L. 36 between Brussels and London. Similar service between Brussels and Cologne is under consideration.

The Rome-Milan-Turin service has been opened with integrated Italian transport.

Build Higher Powered Klein

BERLIN (APR 1939).—The Messerschmitt company brought out a new type provided especially for the substitution of stronger engines with an output of between 70 to 100 h.p. as compared to the standard type, with 40-50 h.p. Solewing engine. The plane has an

increase the same effort as the older type L. 25 b, but the dimensions of the fuselage and arrangement of the engine are suited particularly to the use of the plane for training, training and night flying. The two seats are equipped with double overhead and parachute bar. The landing gear is sparsely.

French Aero Club Holds Seaplane Meet

LA BAULE (FRANCE).—The Aero Club de France staged Sept. 28 and 29 a seaplane meet here, the big launch event on the Atlantic coast, six miles west of St. Nazaire. One of the features was the first public demonstration of the use of artificial smoke clouds for hiding the retreat of May fighting boats. Buckling overboard after, when projectiles missed another seaplane ferry.

The sporting side comprised a Rally, the main event of which was won by a genuine seaplane, M. Bernard de Prement, flying his own machine, a Schreck amphibian powered with a 100-hp. Hispano-Suiza engine. With two passengers, he covered 730 mi., making his officially covered tops and giving 26,600 pounds. St. Charles, an another type of Schreck amphibian, powered with 100-hp. Lorraine, was second.

A landing race over 52 mi. was won by M. Tanguy, on a Schreck (100-hp. Hispano) belonging to M. Villiers-Felix-Kingman-Fleuret, the designer of Schreck machines, was second on one of his productions.

It was planned to include a fast seaplane race for machines averaging more than 150 m.p.h. Unfortunately, the day was too near the recent Schneider Trophy Contest, and neither the British nor the Italian racing machines entered, so the proposal had to be abandoned.

Plane Speeds Ship's Mail

GALWAY (IRELAND).—A plan for further speeding up of mail arriving in Galway by telegraph from the United States was started Aug. 25 by cooperation between the North German Lloyd steamer Karlsruhe and two pilots, Col. Charles Russell and Maj. G. S. Smith of Vickers Ltd., using a Vickers Vimy with a Rolls Royce engine. Mails transferred from the ship to the plane and the pilot took off for London where they landed 4 hr. later. Mail reached the London post office 36 hr. earlier than otherwise. Berlin mail was carried on to Berlin by Luft Hansa plane, the mail arriving 6 hr. earlier than usual. This is considered quite a successful demonstration, and further developments along this line are expected soon.

Develop Tri-Engine Bomber

LEBENBERG (FRANCE).—A tri-engine version of the Bessard monoplane of the Yellow Bird type and by Avion LePrieux and Loris in their train. Vulture flight has appeared here. In place of the 500 hp. Hispano-Suiza motorized engine used on the Yellow Bird, this machine has a Gnome-Rhone Jupiter of 450 hp. at the nose and two 250 hp. wing engines. Speed is 1,370 m.p.h. between 126 and 131 m.p.h. Four passengers are carried as compared with the three carried by the Yellow Bird type. It has a wing spread of 52 ft.



STANAVO

AVIATION

ENGINE OIL

Produced under specifications and tests of the

STANAVO SPECIFICATION BOARD

Organized and maintained by

STANDARD OIL COMPANY OF CALIFORNIA
STANDARD OIL COMPANY . . (INDIANA)
STANDARD OIL COMPANY OF NEW JERSEY

for the advancement of aviation

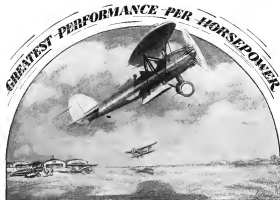
The brand STANAVO is a rigid, practical guarantee of absolute uniformity and highest quality

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One Quality the Highest
Throughout the World

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Direct control with fixed and quickly detachable for passenger carrying.

Landings over light and type with continuous oleo rubber shock absorbers.

Perfect control in steep descent. There has been no sharpening or simplifying.

Metal parts built from brass to our alloying use of its metal composition.

TO achieve the greatest of all performances in the popular-priced class, the Kinner has been introduced as standard BIRD equipment.

Low maintenance cost, uniform performance, the highest possible safety factor and its many other features, expected only in planes of the highest price, are winning more pilots for the BIRD every day. *Fly one today!*

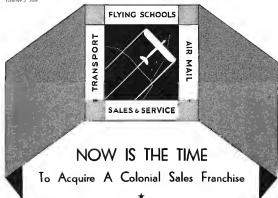
The first entry to be made on the Empire State Building.

Stability perfected to a degree allowing for full-speed air-duct training.

Complete multipole-outstanding throughout highest safety factor in place.

The wing design permits performance comparable to most wings. With no gaps.

BRUNNER-WINKLE AIRCRAFT CORPORATION
17 Haverkamp St., Brooklyn, N. Y.



Rapidly throughout New York State and New England, Colonial dealer franchises are being secured by business men who see the profit possibilities in the sale of planes.

The market for the sale of planes is definitely known and is expanding. It includes: (a) training schools and student flyers; (b) business organizations; (c) private owners; and (d) operation for charter service and passenger hopping.

The line of planes distributed by Colonial Flying Service is too well known to require much comment. It includes those makes best suited to the demands of the volume market: FLEET, CHALLENGER, FAIRCILD, PITCAIRN and STANDARD aeroplanes are distributed by Colonial Flying Service through New York State and New England.

A Colonial dealer has available to him a fund of practical information which is the result of Colonial experience in the successful operation of Air Mail and Air Transport lines.

Any service demands made by a dealer of his customers are easily met through the chain of Colonial Service stations located at strategic points in New York State and New England.

District sales offices are located at Boston, Buffalo, Hartford and Schenectady. Service facilities are also available at Newark, Albany, Utica, Rochester, Cleveland and Toronto and Montreal, Canada.

For complete information as to territories available and conditions for securing a sales agency, write to Colonial Flying Service, Inc., 270 Madison Avenue, New York City.

COLONIAL
FLYING • SERVICE

DIVISION • OF • THE • AVIATION • CORPORATION



Endurance, Speed with NATURALINE!

120 hours and 31 minutes in the air, consuming through out 5,190 gallons of Naturaline. That's the phenomenal record of the St. Louis Robin I, completed on the evening of July 30.

Two wonderful pilots, a wonderful engine, a faithful and capable refueling crew, and Naturaline made the combination that bettered the previous world's record by 173 hours, 57 minutes, and 26 seconds.

Naturaline was used throughout with such satisfying results to

the flyers that when their trained eyes detected a filter they asked immediately if Naturaline was being furnished as before. This great endurance flight, coupled with the known worth of Naturaline as a speed fuel, establish it as the winning fuel pure and simple.

For full information about



Write to:
Naturaline Co. of America
TOLSON, MD.



Naturaline's speed performance was conclusively demonstrated at the Goodrich Cup Race held at St. Louis, May 20th. Bringing home the first four places in comparison with five other gasoline brands. The picture shows is that of "Speed" Helms, the winner, who earlier actually endorses Naturaline.



BLAW-KNOX

If you are going to build an airport, a landing field, or purchase one or more planes, you need this new Bulletin on Firesafe, Steel HANGARS.

Write for Bulletin No. 1130

BLAW-KNOX COMPANY
607 Farmers Bank Bldg., Pittsburgh, Pa.

New York	St. Louis	Birmingham
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Export Division
William Ross & Sons, Inc.,
London, E.C. 4, ENGLAND

HANGARS

RUSSELL "Lobe" PARACHUTE



Now **EQUIPPED**
with the new
RUSSELL
DETACHABLE BACK-PAD



The Russell "Lobe" Parachute fits right into the conventional slot now shown in the back pad, holds the harness in position while jumping an added dorsal cushion for greater comfort.

The back pad includes the complete harness while you are seated in the cockpit in the most manner in use today. It's off and on easily and quickly. . . . An indication of the many other refinements you will find in the Russell "Lobe" Parachute.

Famous flyers, air transport companies, leading schools, individual flyers and aerial passengers the world over have adopted the Russell "Lobe" Parachute as standard flight equipment.

In an emergency you simply pull the release ring on the Russell "Lobe" Parachute down the rear It has a record of 100% efficiency in use!

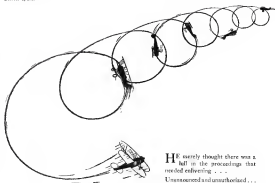
Russell Parachute Company
1202 McIner Blvd.
San Diego, California

Eastern Sales Office: 122 E. 42nd St., New York City

Wearing air men prefer this aerial life-saver because it has no springs, no rubber bands, no pins and is unobtrusive in design, nothing to get out of order.

Ask about the new Russell "Lobe" Proper Silk Parachute, selling at \$175. Other Models, \$20 to \$150.

Branches: Fisher and Fane of Newark, New Jersey and Boston Air Express.



HE surely thought there was a hell in the proceedings that needed enervating . . .

Unannounced and unauthorised . . . sublimely unobtrusive . . . he took to the air again in his borrowed

WACO Taper-Wing and pulled off the real thrill of the meet for the benefit of those stragglers on the Field that evening at Cleveland . . . proceeded to do a whole row of outside loops . . . series of them . . . in immediate succession.

Nobody ever heard of such a thing.

Of course, he was "grounded" for the extraneous contribution to the list of events . . . like the grandeur of old when Napoleon decorated for valor and executed for insubordination.

But R. W. Mackie had passed to himself . . . and to some few thousands of onlookers . . . that the WACO Taper-Wing is absolutely in a class by itself.

You probably wouldn't want to do it . . . even if they didn't ground you for it . . . but you like to know the ship is built that way.

THE WACO AIRCRAFT COMPANY
TROY, OHIO



"ASK ANY PILOT"



A RECORD AND A WIRE

Spokane, Wash.
August 21st, 1939

Successfully completed ocean to ocean nonstop refueling flight covering more than seventy two hundred miles stop Please accept our sincere congratulations to the Buhl Aircraft Company and its engineer in designing a ship which possesses such remarkable features of durability stability and comfort stop Its performance at high altitudes under varying weather conditions carrying heavy overload of eight hundred pounds was noncomparable stop Accommodations in cabin in spite of extra tanks gave us much needed space for moving about and sleeping stop Words cannot express our appreciation of the ship itself and for our many needs which were foreseen and provided for by your company stop With best personal wishes

(Signed) Mamer & Walker

BUHL Aircraft Company

MARSHVILLE, MICHIGAN

The B/J Franchise is Valuable

Man Power

is the secret of success for the B/J distributor and dealer. Back of the B/J plane is the weight of a great staff of foremost aircraft engineers. They were gathered together for the pioneering of new designs for military planes. This same original designing is carried into the B/J commercial planes, truly destined to be pacemakers of the air. Every B/J distributor and dealer knows that back of the plane he sells is an engineering staff that is making history for the planes they build, and permanent profits for the dealer. Some distributor territories are open. . . . Write for information.



AN ENCLOSED PLANE without a blind spot! The illustration at the right shows the modified high wing construction of the new B/J two place seaplane which affords the pilot full vision both above and below the wing. Built in a new, quarter-million dollar plant at Baltimore, with every facility for high-quality, low-cost production, the new B/J will set new standards in reliability as well as in ease of handling and safe, comfortable, carefree flying. For information write to G. Roger Case, Sales Manager, Berliner-Joyce Aircraft Corp., Baltimore, Md.



WHY DOES QUAKER
STATE GIVE YOU
SWEETER LUBRI-
CATION ?

WHY WOULDN'T IT?
THERE'S AN EXTRA
QUART IN EVERY
GALLON !



THE reason for the extra quart in every gallon of Quaker State Aero Oil is the reason why Quaker State gives the smoothest, sweetest lubrication that ever kept an airplane motor purring! And here's the reason . . .

Quaker State Aero Oil is made differently from ordinary oils, different entirely.

Ordinary refining leaves in every gallon of oil, a quart or more of material that has little or no value in lubricating a motor. It is a quart of waste.

But Quaker State is not refined in the ordinary way. It is *super-refined*—carried a step farther than ordinary oils. And this "extra step" removes the quart of waste that ordinary refining leaves in. In its place you get a quart of *himself*—you get an extra quart in every gallon of Quaker State.

And here's another important thing—Quaker State Aero Oil is made from the very finest crude oil that Nature produces, 100% Pure Pennsylvania Grade Crude—the value of which is two or three times that of the crudes from which ordinary oils are made.

Quaker State is sold everywhere—there are over 600 distributing warehouses and more than 80,000 dealers in the United States and Canada. Ask for it at your airport and you'll get the smoothest, slickest lubrication your motor ever purring over!

QUAKER STATE AERO OIL

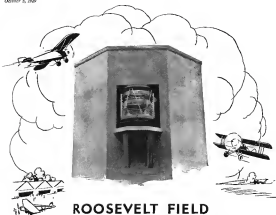
QUAKER STATE OIL REFINING COMPANY

Oil City, Pa.

... .. Quaker State Pennsylvania Products Are

QUAKER STATE HIGHLY MOTOR OIL
QUAKER STATE COOLING OIL

QUAKER STATE LIGHTLY MOTOR OIL
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ROOSEVELT FIELD CHOOSES SPERRY-A.G.A. FLOODLIGHT

Quick to realize its many important advantages, officials of Roosevelt Field have selected the SPERRY—A.G.A. Floodlight.

Airport officials and pilots who have observed and used this light are one in praising its great power; sharp cut off, preventing blinding; its smooth operation; and reliability with its fully automatic lamp mechanism, eliminating the need of constant attention while in operation.

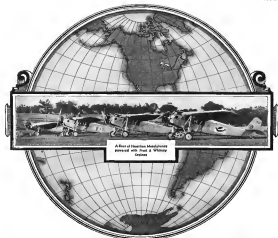
We gladly supply detailed information concerning this remarkable Floodlight upon request.

SPERRY GYROSCOPE CO., INC.

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LOS ANGELES SAN FRANCISCO



EVERY HAMILTON METALPLANE ever built IS STILL IN OPERATION

THE foregoing statement is entirely in line with the new standards of safety, durability and continued service that Aluminum and its alloys have brought to aircraft design.

Great fleets of Hamilton Metalplanes are in the air continuously—under every flying condition to be encountered between the Arctic and the Tropics.

Every one of them has met these conditions safely, satisfactorily, economically.

Hamilton designers have secured unusual strength, lightness and freedom

from the cohesive action of the elements through the use of ALCLAD alloying heat-treated Aluminum alloys, authorized with pure non-combustible Aluminums.

Aluminum Company of America, creator and producer of ALCLAD products, invites inquiry, correspondence and personal inspection with its technical staff on any phase of the application of Aluminum to aircraft design.



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240 Olive St., Pittsburgh, Pa.
Office at 29 Principal American Cities

ALUMINUM AND ITS ALLOYS FOR AIRCRAFT

SOHIO EXECUTIVES TO TRAVEL BY AIR



Officers of Standard Oil Company of Ohio Take Delivery of New Ryan Brougham

Business has taken to wings. Executives of hundreds of organizations now use the skyways—for safe, reliable air transportation has introduced a new era of managerial efficiency.

Among the rapidly increasing number of organizations which are providing private planes for their officials is the Standard Oil Company of Ohio.

The picture above shows A. M. Maxwell, vice-president in charge of Sohio sales, taking delivery of the "Schooner"—a new Ryan Brougham. At the right is Howard G. Jones, vice-president and treasurer of Sohio, and at the left is Dewey L. Noyes, the "Schooner's" pilot.

Clifford C. Gilmore, president of U. S. Airlines of Cleveland and Ryan distributor for Ohio, is standing over the keys.

Choice by Sohio of the new Ryan Brougham for its, with its Wright 300H P Whetford Nine, is another tribute to the well-earned leadership Ryan planes enjoy throughout the world.

Brilliant performance, inherent safety, together with speed and exceptional ruggedness, are characteristic of the hundreds of Ryan ships in service both at home and abroad.



Those powered by the new Wright J6—with its additional hundred horse power—use achieving new performance and reliability records for their owners.

The new Ryan Brougham provides a cruising range of 300 miles—cruising speed of 130 miles per hour. It takes off fully loaded in 225 feet and in 8 seconds takes and it lands in a 200-foot circle. Ryan's performance and safety records are unequalled by ships of its class.

Let us show you how the Ryan Brougham, or the Ryan Flying office will provide you, too, with new business advantages. Or write for our handsomely illustrated catalog containing complete information.

RYAN AIRCRAFT CORPORATION

Divided of
DETROIT AIRCRAFT CORPORATION
Learney St. Louis Airport
ANN ARBOR, MICHIGAN



SISTER SHIP OF THE "SPIRIT OF ST. LOUIS"



Safeguarding

the Night Sky Rider—

SAFETY—the watchword of commercial aviation—is not obtained in airport lighting by simply flooding the landing area with illumination of high intensity. Although sufficient light to reveal all surface details to the pilot must be spread over the runways, more important factors which enter into this class of illumination are:

1. Proper distribution of floodlights so that in landing the pilot never faces the source of light, regardless of the direction of wind.
2. Elimination of glare by keeping the light beams close to the ground and by cutting off the upward rays of light.



3. Utmost reliability, insured by the use of sufficient floodlighting units to make lighting failure at a critical moment practically impossible.

4. Simple and instantaneous operation to provide illumination at a moment's notice for emergency or unexpected landings.

These requisites of safe illumination are fully met by a Westinghouse airport lighting installation. And in many airports throughout the country Westinghouse lighting equipment is making night air transport safer.

Write for Special Publication 1854, Westinghouse Airport Lighting.

WESTINGHOUSE ELECTRIC & MFG. COMPANY
40015 BEND ROAD SOUTH BEND, INDIANA

SALES OFFICES AND SERVICE SHOPS IN ALL
PRINCIPAL CITIES OF THE UNITED STATES

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Serves the Aviation Industry with:

Boundary, Approach, Obstruction Lights
Runways
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Transmitters
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Aircraft Fuel
Micro Projections

Micro Pulses
Micros For Leads and
Flights
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Grounding Landing Field
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Hangar and Building Flood-
lighting

an IDEAL MATERIAL FOR HANGARS



..it is much more permanent than ordinary corrugated metal

..it costs much less than "heavy construction"

RPM hangars can be enlarged, moved, taken down or re-erected

HERE is a material for hangars that is the happy medium between short-lived, unprotected metal roofing that rusts away before your very eyes . . . and the so-called "heavy construction" that costs far too much, and that cannot readily be changed, enlarged, or moved (and this last is a serious thing in a business that is changing and growing the way aviation is).

This ideal material that avoids the shortcomings of both the other kinds of construction is Robertson Protected Metal (RPM).

It is a solid steel sheet, corrugated for strength, and so skillfully protected with EXTERNAL coverings, that it is rust and corrosion-proof, and does not require painting or any other maintenance.

It is so economical in price that a hangar of RPM will often cost less than half of "heavy construction." Yet it will last for years and years and years without any attention.

It can be erected as easily and as quickly as the old unprotected metal. It can be taken down and moved across the air field, across the city, across the country . . . and erected again.

For any additional information about RPM, write to:

H. H. ROBERTSON COMPANY • PITTSBURGH, PA.

ROBERTSON

Has the Experience



A Hangar covered with RPM at the Municipal Flying Field, Chicago, Illinois

PIONEERS

AND SET THE STANDARD AMERICAN COMPANIES
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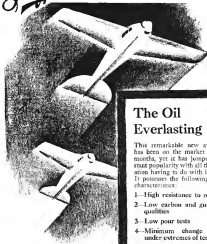
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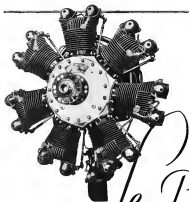
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A clean-up at Cleveland

NO COMMERCIAL plane has ever made such a complete demonstration of superiority as the Bellanca at the Cleveland National Air Races. Out of 7 events entered, the Bellanca took models took 9 First Prizes, a Second, 3 Third, and 4 Fourth. It is a remarkable tribute to Bellanca that, where measured on combined speed, carrying capacity and takeoff, almost the same design has won so repeatedly—originally and essentially a Bellanca design.

For the fifth time a Bellanca replaced cabin monoplane captured the Aviation Town and Country Club Trophy for the third time, the Greater News Trophy for Speed and Efficiency. In the latter contest, planes were required to take off with full Department of Commerce loaded weight within 300 ft., which both Bellancas did easily, though these other cabin planes, some of equal, some of greater h.p. and some carrying less load than the Bellanca, tried at Cleveland to take off in less distance.

Here are the official records:

Philadelphia-Cleveland Derby

First Place	J. Wesley Smith	Bellanca 300 hp.
Third Place	Howard E. Young	Bellanca 220 hp.

Cleveland Buffalo Efficiency Contest

First Place	George W. Halderman	Bellanca 300 hp.
Second Place	J. Wesley Smith	Bellanca 300 hp.
Fourth Place	Howard E. Young	Bellanca 220 hp.

Greater News Trophy for Speed and Efficiency

(That race won by a Bellanca each year)

First Place	George W. Halderman	Curtis 300 hp.
Second Place	J. Wesley Smith	Bellanca 220 hp.

Five Efficiency

First Place	George W. Halderman	Bellanca 300 hp.
Third Place	J. Wesley Smith	Bellanca 300 hp.
Fourth Place	Howard E. Young	Bellanca 220 hp.

Aviation Town and Country Club Trophy

(With race won by a Bellanca)

First Place	J. Wesley Smith	Bellanca 300 hp.
-------------	-----------------	------------------

The sales actually closed at Cleveland were the best possible confirmation of these triumphous results. For Bellanca, Cleveland definitely applied a new step of progress that will be shared by every Bellanca sales representative. Bellanca Aircraft Corporation, New Castle, Delaware.

BELLANCA



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To maintain comfortable working temperatures in hangars, with the doors periodically thrown wide open, requires a highly flexible heating system which can deliver a large amount of heat almost instantaneously. The method of heating best suited to meet these conditions is a proper installation of unit heaters.

Continued satisfactory operation of such a heating system requires careful selection of units as well as the correct method of installation. Trane Unit Heating is an engineered job, from the patented Trane heating element to the final checking of a Trane Unit Heater installation. The units are installed to deliver a downward flow of heated



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or pipe coil radiation. You can augment your present heating system with Trane Unit Heaters, or better still, you will find a complete change-over most profitable.

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Company
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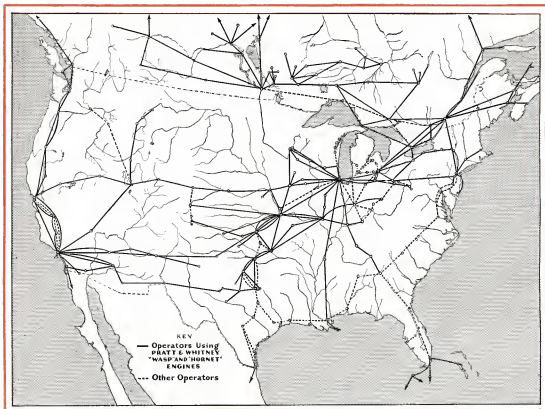


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WHERE TO FLY

Page 70



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